

Arbitrariness, Motivation, and the Linguistic Sign

著者 (英)	Tim Dowling
journal or publication title	Language and Culture : The Journal of the Institute for Language and Culture
number	20
page range	103-116
year	2016-03-16
URL	http://doi.org/10.14990/00001720

Arbitrariness, Motivation, and the Linguistic Sign

Tim DOWLING

要旨

言語記号は、記号表現（音声）と記号内容（意味）の二つの面から構成される。現代の研究において、この記号表現と記号内容の結合の概念は、恣意性あるいは有契性に対極をなしてきている。Theo van Leeuwen など多くの言語論者は、Saussure の原理、つまり言語記号は固定されており、その対象とは無関係であるという恣意性 (arbitrary) に対して、言語記号はその対象と合理的関係性があり、使用される際に新たに語義が形成されると指摘している。本稿では、様々な言語記号の見解を調査した結果、Saussure の理論は、すべての記号は概念的に恣意性であるが、使用されるなかで常に動機づけられるとも示唆していることを論じる。

キーワード

- ・ Saussure
- ・ linguistic sign
- ・ signifier and signified
- ・ arbitrariness and motivation

1. Introduction

The study of the sign, the conjunction of a form (signifier) with a meaning (signified), in semiotics has been polarised between conceptualising it as being either *arbitrary* or *motivated*. In modern linguistics the notion of the sign being arbitrary can be traced back to the notes taken at Saussure's lectures by students and which were posthumously published as *Course in General Linguistics* (CGL) ([1916] 1986) in which Saussure gave a conceptual account of the linguistic sign as being an arbitrary conjoining of a sound pattern with a meaning (CGL: 65-69). This concept is not new and its history can be traced back to philosophers such as Plato (*Cratylus*, 384.d) and Aristotle (*On Interpretation*, 1. 16^a1 – 2. 16^b5). Contemporary social semiotic thinkers on the other hand, such as Hodge & Kress (1988), Kress (1993, 2010), Kress and van Leeuwen (2006), Machin (2007, 2010), van Leeuwen (1999, 2005), van Leeuwen and Jewitt (2001), among others, take a different approach and explore how people use signs to express ideology and

meaning through a variety of mediums such as visual designs, music, television and film. From this perspective the suggestion is that all signs (linguistic and others) are motivated.

In my opinion both conceptions are correct, but in different ways because each is considering the sign and the notions of arbitrariness and motivation differently. However, both are capturing something fundamental about what a sign can possibly be and what it actually is. Halliday (1978a: 11) in his essay *Language and social man (part 1)* gives a diagram of linguistic studies and their relations to other academic disciplines, given below in Figure 1. From this diagram we can see that Saussure's formulation of the linguistic sign lies within the 'conceptual' angle (the central triangle's bottom-right corner) and the social semiotic thinkers' conception of the sign lies in the 'situational' perspective (the central triangle's bottom-left corner). Although Saussure conceptually articulated the linguistic sign to be arbitrary he fully recognised motivation in language use: 'There exists no language in which nothing at all is motivated. Even to conceive of such a language is an impossibility by definition' (CGL: 131).

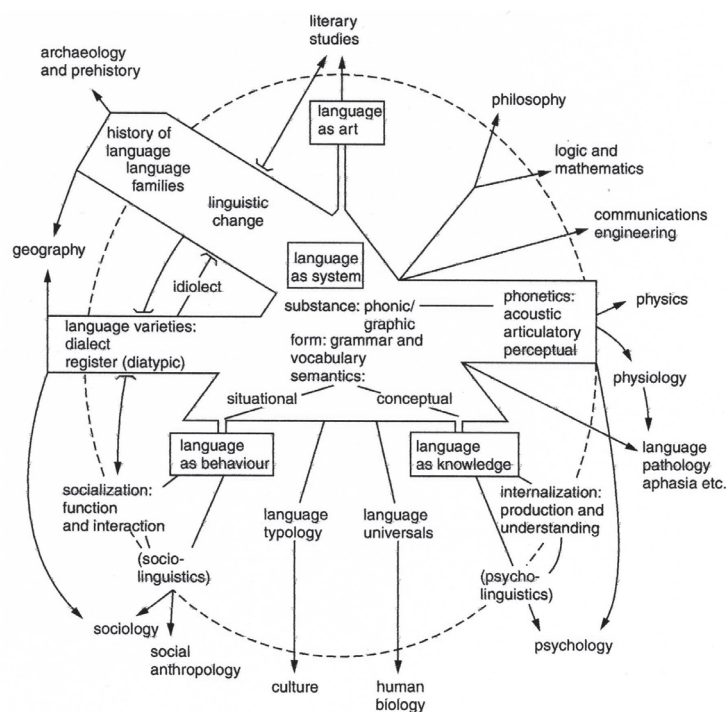


Figure 1. Halliday's Diagram of the Nature of Linguistic Studies and their Relationship to other Fields of Scholarship.

In this essay I will outline what a sign is and introduce Saussure's, Peirce's, and Barthes' concepts. Then I will introduce what is meant by the terms *arbitrary* and *motivated* and apply these to the different types of signs and the account given in social semiotics. I will conclude that different sign types are conceptually arbitrary and motivated in varying degrees according to differing, but valid conceptualisations, but are, according to Saussure and contemporary social semiotic thinkers, always motivated in use.

2. What is a sign?

2.1

Anything can be a sign – marks on cave walls, scratches on stones, writing on papyrus, tree, /tri:/, arbor, 木, قرجش, 树, colour, shape, ⊕, ∪, ♪, :-), ☺, (^_^), loudness, taste, smell, touch, emotion, temperature, smoke, clouds in the sky, a portrait, a pub sign, a brand name, its logo and its image, a red rose, a ticking clock, a heartbeat, cash registers, the Eiffel Tower, DNA, a gesture, $E = MC^2$, π , 2, II, 二, ʌ, hello, こんにちは, the prism on the cover of Pink Floyd's Dark Side of the Moon album (1973), the fonts used on the cover of the Sex Pistols' 'Never Mind the Bollocks Here's the Sex Pistols' (1977), a leitmotif such as the Tristan Chord in Wagner's Ring Cycle or John Cage's 'musical composition' 4'33'', where there is a score, but no notes and which might be best described as 'performance art' rather than 'music'. But nothing is a sign until it is *made*, *used* and/or *interpreted* to stand for something for some person. All signs, therefore, are motivated in use.

2.2

But the concept of what a sign is has been conceived differently. Saussure (CGL: 67) conceptualised a linguistic sign to be dyadic, a signifier (sound pattern) conjoined with a signified (meaning, or concept), as shown in Figure 2 below.

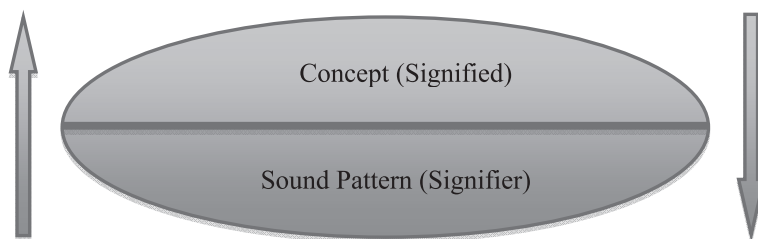


Figure 2. Saussure's Linguistic Sign

Saussure's 'linguistic sign is not a link between a thing (in the material world) and a name,' but is, in its totality, something purely psychological – a mental concept associatively linked to a mental impression of the sound pattern rather than the actual physical sound made when speaking (CGL: 66). The linguistic sign for Saussure is therefore purely mental. In his abstract conception of the linguistic sign Saussure prioritises the mentalistic *langue* over the conversational *parole* (CGL: 9) and that *values* (meanings) are relations between these mentalistic signs (CGL: 113). However, tellingly from this account, the mental concept of the sound pattern does correspond to the actual physical sound for it to be a mental impression of it. How this relationship is possible we are not told explicitly, but judging by Saussure's account of thought (A) and sound patterns (B), given below in Figure 3, language arises through the margins of contact between these two planes, giving rise to a form and not a substance (CGL: 110-111).

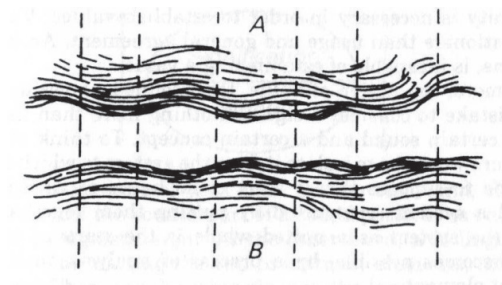


Figure 3. Saussure's Planes of Thought (A) and Sound Patterns (B).

'Contact' suggests a causal relationship, as with the wind upon the surface of the sea to create waves. Although the planes are of different 'substances' Saussure's account appears to be one of interaction rather than the parallelism of epiphenomenal dualism. Despite Saussure's attempt at this point in his lectures to give an abstract, mentalistic account, his notion of the linguistic sign does nonetheless relate to the socio-temporal common events of everyday life through a causal relationship.

The meaning of the linguistic sign is the counterpart of the sound pattern, i.e., the concept (CGL: 112) and this relationship is inseparable just as it is 'impossible to take a pair of scissors and cut one side of paper without at the same time cutting the other (CGL: 111). The arrows in the diagram represent the intimate link

between these dyadic elements such that someone cannot be conscious of the sound pattern without also being aware of the concept and vice versa once the concept and sound pattern have been conjoined and fixed in language by public usage (CGL: 67). As language is inherited from generation to generation there is a degree of invariability in the meaning associated with any given sign (CGL: 72). However, although the relationship between the concept and sound pattern in a linguistic sign is inseparable it can shift through time. As Saussure notes, languages are located socially and chronologically (CGL: 76) and change over time which always results in '*a shift in the relationship between signal and signification.*' [original italics] (CGL: 75). This is possible because the relationship between the concept and the sound pattern is fundamentally arbitrary allowing their relationship to change, even though they remain conjoined (CGL: 76). Thus Saussure's sign is not as fixed and decontextualized as van Leeuwen suggests (1999: 193), but is fully fluid and dynamic within a socio-temporal context.

2.3

Peirce, in contrast, considered signs to be triadic; a *sign* signifies an *object* and this signification creates a mental *interpretant* which refers back to the same *object* that the *sign* signified (1998: 13). Peirce envisioned ten main trichotomies of signs, but the one he said he most often used was the fourth trichotomy – Icon, Index, and Symbol (1998: 489) and which is the one most discussed in semiotic literature. Icons are 'likenesses' in that they resemble what they depict, for example a photograph or a diagram that illustrates the important features (1998: 13). An Index is a sign that is related to its object, 'by virtue of a real connection with it, or because it forces the mind to attend to that object' (1998: 14). Here Peirce gives examples of a barometer, a weathercock, the pole star, a pointed finger and pronouns. Symbols are signs, 'which have become associated with their meanings by usage' (1998: 5) and gives words and phrases as examples.

Even though Peirce used these three discrete categories he realised that individual signs can each be co-interpreted according to the three categories and gives an example of maps which can be both an Icon in terms of the resemblance of the drawn shapes with the actual coastlines and also an Index in that it indicates something particular (1998: 8). It could also be said that the colours to represent altitude and the legend are Symbolic in that they are agreed upon by common

usage. Signs can therefore be simple or complex.

It should be noted that although Peirce categorised language as a Symbol, Saussure felt that this word was inappropriate because for him the linguistic sign is arbitrary and that a symbol, such as the scales that represent justice, is already pre-loaded with meaning and cannot therefore be arbitrary (CGL: 68). However, despite the conflict of terminology both Saussure and Peirce would concur that language is something that has come about by common agreement in usage and we only need to look at pidgin and creole languages to confirm such an evolutionary development.

2.4

Signs, however, do not just denote, as Saussure's and Peirce's do, they can also connote. Denotation is a first-order of meaning and connotation is a second-order of meaning. Barthes depicts this layering in *Myth Today* (2009: 138), Figure 4. For example, (Kress, 2001: 174 and 178) the word 'green' (1. Signifier) denotes the colour (2. Signified) and forms the Sign (3) at the first-order of meaning, but at a second level the original Sign (3) becomes the second-order I SIGNIFIER to connote 'unripeness/immaturity' II SIGNIFIED to produce III SIGN.

1. Signifier	2. Signified	
3. Sign		
I SIGNIFIER		II SIGNIFIED
III SIGN		

Figure 4. Barthes' Conceptualisation of Denotation and Connotation.

Thus signs can conceptually be conceived in a multiplicity of ways (dyadic or triadic; iconic, indexical, or symbolic; denotative or connotative; and simple or complex). But are all these signs arbitrary or are they instead motivated, as social semiotics suggests all signs are, and to what degree? In the next section I will turn to discussing what *arbitrariness* and *motivation* mean and how applicable they are to the different sign types.

3. Arbitrariness and Motivation

3.1

One dimension of categorising signs is according to the notions of *arbitrariness* and *motivation*. An *arbitrary* sign is one where the relationship of a signifier with a signified has, ‘no natural connexion in reality’ (CGL: 69). In accordance with its etymology, an arbitrary sign is one where any signifier could be chosen to stand for any signified. That is to say, there are no logical, necessary and sufficient conditions for any signifier to signify any given signified. For example, different languages have different words to refer to common items – a *book* in English is pronounced /buk/ and written ‘Book’ or ‘book’ but is pronounced /hɒn/ and written 本 in Japanese. Different cultures, through their histories, have selected different phonemes and graphemes, and each could have chosen differently, to signify a common object which bears no natural or logical relationship to these signifiers – a book does not look like the grapheme 本 nor sound /hɒn/ when touched (CGL: 67-68). It is as if by accident and common agreement in various cultures that a particular Symbol designates a given Object. Why is it that the phoneme /æ/ can be written using *a* (lower-case) or *A* (upper-case) in English or as あ (hiragana) or ア (katakana) in Japanese? Why is it that the graphemes *a* or *A* can also represent the phonemes /eɪ/ and /ə/ in *data* /'deɪtə/ (CGL: 117-118)? Symbols are conceptually the most arbitrary of the signs and this is why Saussure considered the linguistic sign to be arbitrary (CGL: 67). As Halliday notes:

When we talk about the arbitrariness of the sign, we are referring to the Saussurean content/expression relation. I believe every linguist must agree that there is arbitrariness at this point. But there is I think just this one point in the whole linguistic system where we can talk about arbitrariness...
(1978b: 44)

3.2

A *motivated* sign, on the other hand, is one where there is a *reason* to connect a signifier to a signified. A sign can be motivated in a number of different ways: through causation, resemblance, indexation, and intention. For example, a video recording (signifier) of a concert (signified) is highly motivated as it represents (resembles and indexes) to a high degree of fidelity what was presented. As

Chandler (2007: 254) notes, ‘The more a signifier is constrained by the signified, the more ‘motivated’ the sign is...’ There is thus a continuum along which signs can be aligned to be more or less arbitrary/motivated.

3.3

Applying the concepts of arbitrariness and motivation through a cline to Peirce’s and Saussure’s concepts of the denotative sign we can see the following relationships. An Index is highly motivated in that there is a strong cause/effect relationship with the Sign and Object when the weathercock changes direction indicating the wind’s movement and indexation with a pointing finger. An Icon is partially arbitrary/motivated depending on the degree of resemblance of the Sign with the Object. A Symbol, being a sign that has no natural, logical, or intrinsic relation to what it stands for, or where this relation has been long lost in history (van Leeuwen: 2005: 49), thus is, or appears, totally arbitrary.

Barthes (2009: 150) thinks that connotation is motivated. In usage this is correct, as all language is, but conceptually connotation is second-order arbitrariness. First there is the arbitrary sound pattern /rəʊz/ denoting the plant and then there is the arbitrary plant connoting love and romance. Why was a red rose chosen to connote romantic love rather than a white one or a tulip or daffodil or something completely different? There is nothing intrinsic about a red rose to connect it with romance. The connotation is an arbitrary convention.

3.4

Despite Peirce’s Symbol and Saussure’s linguistic sign being arbitrary, Saussure recognised relative motivation in the case of onomatopoeic words and exclamations (CGL: 69), but as different cultures have different sound patterns to represent these the linguistic sign remains fundamentally arbitrary. For example the onomatopoeic word for a dog’s bark is ‘woof’ or ‘bow-wow’ in English, but ‘wanwan’ in Japanese. Further, Saussure recognized that compound words are less unmotivated than the basic parts of which they are composed. For example, *wrist* and *watch* taken individually appear highly unmotivated, but *wristwatch*, being a compound of these two words, is less unmotivated. It is less unmotivated in that although a completely different word/sound pattern could have been used to refer to the timepiece we wear on our wrists, a compound of the names of the place on the body where the item is worn and the object itself were chosen instead.

This applies to not just compound nouns but also to other ways in which words can be created with pre-existing units such as prefixes and suffixes (CGL: 130) in, for example, *un+success+ful+ly*.

Saussure thinks that relative arbitrariness/motivation is important:

...the entire linguistic system is founded upon the irrational principle that the sign is arbitrary. Applied without restriction, this principle would lead to utter chaos. But the mind succeeds in introducing a principle of order and regularity into certain areas of the mass of signs. That is the role of relative motivation. (CGL: 131)

Thus, if all signs were constantly being used in an arbitrary way, with meanings constantly being expressed by different sound patterns then communication could not take place. However, as is plainly the case, linguistic signs, although essentially psychological and arbitrary, are ratified by collective agreement within communities of language users (CGL: 15). People do tend to fix relationships between concepts and sound patterns (and also written patterns), as any dictionary records, and through looking at past definitions we can also see that this relationship is only relatively fixed as words and sound patterns change over time (diachronic) and are different in various geographies and contexts (synchronic).

Thus conceptually signs can be considered to fall within a cline of being arbitrary/motivated. Conceptually Saussure rightly articulated the linguistic sign to be arbitrary (CGL: 67), but also thought that all language is motivated in use (CGL: 131) and to this view I subscribe, and it is at this point where social semiotic thinkers make progress in developing an understanding of meaning in use.

4. The Motivated Sign

4.1

Kress criticises the abstractness of Saussure's linguistic sign, although he does accept the arbitrary relation between the sound shape and meaning (Kress, 2010: 63). For Kress and other social semioticians the study of the sign is in its use to convey meaning focusing, 'on the *material*, the *specific*, the *making* of signs *now*,

in this environment for this occasion (Kress, 2010: 13) and avoids using Peirce's classification of signs because it allows for degrees of arbitrariness (Kress, 2010: 65). For Kress, signs are always newly made in an act of *semiosis* (Kress, 2010: 54) in social interaction, and being a motivated conjunction of form and meaning based on the interest of the sign-maker using culturally available resources (Kress, 2010: 10).

The conjunction of a form with a meaning is of choosing an apt signifier to signify a signified (Kress, 2010, 55). Kress (1993: 172) provides a beautiful example of his son's drawing of a car shown below in Figure 5.

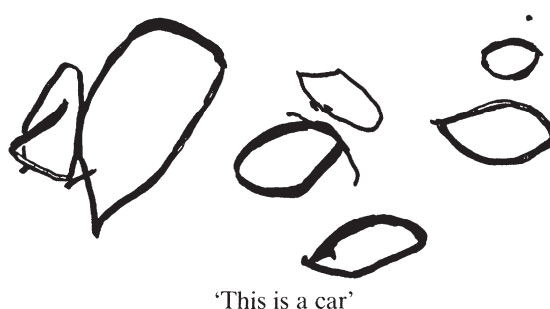


Figure 5. 'This is a car'

Kress' son wanted to depict his idea of a car and did so using the semiotic resources he had that he felt best fit the task and chose circles (signifier) to represent the tyres and possibly the windscreen (signified) of a car due to their resemblance. The child selected circles (Iconic in their resemblance and Indexical in their reference) to signify the wheels. The word 'wheel' (Symbolic in its arbitrariness of sound pattern and meaning) would also be an apt signifier in English speaking contexts. Kress (1993: 172) notes, 'It is important to insist that the sign is always motivated from the point of view of the object...' This is true to a certain extent, but also the sign can similarly be motivated from the point of view of the subject. I depict what I want to depict. I determine the focus and then the focus determines what I see. *Interest* 'determines the characteristics that are to be selected and to be represented' (Kress, 1993: 173). *Interest* indicates motivation.


The motivated sign can also be transparent or opaque (Kress, 1993: 180). It is always transparent to the person making the sign, but it can be relatively opaque

for the listener or reader. Looking at the drawing, ‘This is a car’, without having read the title we would probably have no idea what the circles signified. The sign would be extremely opaque, yet to the sign maker it was obviously transparent that they signified the wheels and possible windows of a car.

4.2

In English we do not use words beginning with the sequential letters *p* and *q* even though this is conceptually possible. Thus this semiotic resource is currently latent, as are so many others. Instead, in our spoken and written language we use, most of the time, a vast array of pre-existing words, phrases, and other semiotic resources, that are ready-made signs (Kress, 1993: 173) and select the most appropriate for the given situation. My selection is my personal choice, my motivation, and indicates an individual shaping the course of language change. Saussure assumes that language is external to each individual, that it is a social phenomenon, and that it is ‘a kind of contract agreed between the members of a community’ (CGL: 14). As such the individual is powerless to create or modify it. This is not an incoherent viewpoint. A lone voice in a crowd is not always heard and we are born into a pre-existing language system which we first have to learn before we can start to make changes. Or can the ‘mistakes’ of the language learner(s) seep into mainstream usage, such as with the phrase, ‘Long time no see’? But we have to remember that a language community is composed of individuals and each plays a part in its evolution. Although the sound and visual patterns of meanings are relatively fixed, that is to say, I cannot use just any word to mean what I want it to if I want to make myself understood to others, I can introduce novelties that may be taken up by others and which might become mainstream usage in the future. Nonetheless pre-existing signs can be motivated in that I have intentionally selected them to convey a specific meaning in a given context. It is as if a person selects a sound and/or visual pattern and imbues it with meaning, again, newly for pre-existing semiotic resources, to become a signifier to signify a signified for somebody, including themselves. People have *made*, *reuse* and *make* new signs to convey specific meanings in specific contexts. Every time a sign is reused or made it has to be reconfirmed or interpreted and thus signs are always newly made (Kress, 2010: 62). The motivated sign is dynamic in its social, cultural, and historical context.

4.3

It might be said that a limitation of Saussure's linguistic sign is that it is *monomodal*. In speech the linguistic sign is only a matching of a sound pattern with a meaning - /tri:/ means  - and fails to take into account intonation, rising for a question and falling for a statement (Kress, 2010: 58) and to this we might also add pronunciation (regional accents), fluency (skillful and confident), pitch (high being nervous), speed (calm or panicky). These factors are motivational as they tell us something about the meaning of the sign. They could be causal in the case of nervousness, or intentional when changing your accent for a different social context. These factors could all be built into Saussure's model of the linguistic sign by envisioning family sets of related signs where each of the different sound patterns related to intonation, pronunciation etc, is in. For example in the set for TREE there would be signs where the sound patterns were all variations of /tri:/ amended according to the various motivated factors and these sets of signs would be set in further sets, building from letters, to words, to sentences. This appears to be a rather complicated model, but may not be so different from the idea of a sign-complex (Kress, 2010: 54).

In social contexts it is not just the mode of speech that communicates meaning, but also the social-semiotic factors accompanying the interchange such as facial expression, gaze, posture, proximity, etc. All of these factors are motivated (Kress, 2010: 58). Kress notes that social semiotic signs are complex, 'Signs exist in all modes, so that all modes need to be considered for their contribution to the meaning of a *sign-complex*' (2010: 54) and later that, 'The *ensemble of signs* as a whole makes meaning' (Kress, 2010: 58). Therefore, signs used and made for conveying meaning in a social context are multimodal and motivated.

5. Conclusion

To summarise my main points, any sign is the conjunction of a signifier with a signified. Signs can be considered from a conceptual aspect (Saussure's linguistic sign) where it is logically possible for any signifier to signify any signified, or from a situational aspect (social semiotics) where a signifier has been selected, made *material*, by an individual to signify a signified in a social, cultural, historical, multimodal, environment. Signs can be dyadic or triadic; indexical, iconic, or symbolic; denotive or connotative; and simple or complex. Are all signs

motivated as social semiotics suggests? In my opinion, conceptually, signs can be considered to be located along a cline of being motivated/arbitrary. With the ancient Greek philosophers, Saussure and Halliday I think the linguistic sign is conceptually arbitrary, but in use, as Saussure, Halliday and social semiotics suggest, all signs are motivated, having been selected from pre-existing semiotic resources and newly recreated or created for a contemporary socio-cultural situation to be the vehicle that delivers the intended meaning.

References

- Aristotle. (1956) 'De Interpretatione [On Interpretation]', translated by J. L. Ackrill, 2nd edition. In *The Complete Works of Aristotle – The Revised Oxford Translation – Volume 1*. (1984) edited by Jonathan Barnes. Princeton: Princeton University Press, 25-38.
- Barnes, J. (ed.) (1984) *The Complete Works of Aristotle – The Revised Oxford Translation – Volume 1*. Princeton: Princeton University Press.
- Barthes, R. ([1957] 2009) 'Myth Today', translation by Jonathan Cape (1972) in *Mythologies*. London: Vintage, 129-187.
- Barthes, R. (2009) *Mythologies*. London: Vintage.
- Chandler, D. (2007) *Semiotics for Beginners*, 2nd edition. London: Routledge.
- Cobley, P. (ed.) (2001) *The Routledge Companion to Semiotics and Linguistics*. London: Routledge.
- Halliday, M. A. K. (1978a) 'Language and social man (part 1).' In Halliday, M. A. K. (1978) *Language as social semiotic*. London: Arnold, 8-35.
- Halliday, M. A. K. (1978b) 'A social-functional approach to language.' In Halliday, M. A. K. (1978) *Language as social semiotic*. London: Arnold, 36-58.
- Halliday, M. A. K. (1978) *Language as social semiotic*. London: Arnold
- Hamilton, E. and Huntington Cairns, (eds.) second printing with corrections (1963), *The Collected Dialogues of Plato*, Bollingen Series LXXI. Princeton: Princeton.
- Hodge, R. and G. Kress (1988) *Social Semiotics*. New York: Cornell University Press.
- Kress, G. (1993) 'Against arbitrariness: the social production of the sign as a foundational issue in critical discourse analysis.' *Discourse & Society*, Vol. 4 (2): 169-191.
- Kress, G. (2001) 'Connotation'. In *The Routledge Companion to Semiotics and linguistics*, edited by Paul Cobley. London: Routledge, 174.
- Kress, G. (2001) 'Denotation'. In *The Routledge Companion to Semiotics and Linguistics*, edited by Paul Cobley. London: Routledge, 178.
- Kress, G. (2010) *Multimodality: A Social Semiotic Approach to Contemporary Communication*. London: Routledge.
- Kress, G. and T. van Leeuwen (2006) *Reading Images: The Grammar of Visual Design* (2nd edition). London: Routledge.
- Machin, D. (2007) *Introduction to Multimodal Analysis*. London: Hodder Arnold.
- Machin, D. (2010) *Analysing Popular Music: Image, Sound, Text*. London: Sage.
- Peirce, C. S. (1998) *The Essential Peirce – Selected Philosophical Writings Volume 2 (1893-1913)*, edited by the Peirce Edition Project. Bloomington and Indianapolis: Indiana University Press.

- Plato. 'Cratylus', translated by Benjamin Jowett (1892) in *The Collected Dialogues of Plato*, Edited by Edith Hamilton and Huntington Cairns, second printing with corrections (1963). Bollingen Series LXXI, Princeton: Princeton University Press, 421-474.
- Saussure, de Ferdinand, (1986 [1972]) *Course in General Linguistics* (Translated and Annotated by Roy Harris, 1983). Chicago and La Salle, Illinois: Open Court.
- Van Leeuwen, T. (1999) *Speech, Music, Sound*. Basingstoke: Macmillan.
- Van Leeuwen, T. (2005) *Introducing Social Semiotics*. London: Routledge.
- Van Leeuwen, T. and Jewitt, C. (2001) *Handbook of Visual Analysis*. London: Sage.